CHAPTER 19

THE CO-EXISTENCE OF COPYRIGHT AND PATENT LAWS TO PROTECT INNOVATION

A CASE STUDY OF 3D PRINTING IN UK AND AUSTRALIAN LAW

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1. Introduction

Patents and copyrights, more than any other class of cases belonging to forensic discussions, approach what may be called the metaphysics of law, where the distinctions are, or at least may be, very subtle and refined, and, sometimes, almost evanescent—Justice Joseph Story.[1]

The overriding aims of intellectual property (IP) laws are to ensure that creativity and innovation are facilitated, and that society is provided with the fruits of these creative and innovative efforts (Howell 2012). The most effective way to achieve

these ends is to ensure that an optimal balance is struck between the rights of originators and users of works, processes, and products. The IP framework historically drew a clear distinction between the creative world of books, music, plays, and artistic works protected by copyright laws, and the inventive, functional world of machines, medicines, and manufacturing protected by patent laws (George 2015). Increasingly, however, the neat legal divide between creativity and functionality is blurring, a fact aptly exemplified by the technological advances wrought by three-dimensional (3D) printing, resulting in gaps in protection in some circumstances, and overlapping protection in others (Weatherall 2011).

Legislatures, courts, and IP offices have struggled to come to terms with the problem of how to apply existing IP laws to emergent technologies (McLennan and Rimmer 2012). One example of the types of dilemmas being faced by lawmakers is the question of whether software is a literary work that provides the reader with information, or an inventive work designed to perform a technical function (Wong 2013). Similarly, is a 3D object a creative artwork, or a functional object? In biomedicine, is a DNA sequence a newly isolated chemical, or simply a set of information?

This chapter considers these issues in the context of 3D printing and scanning (technically known as 'additive manufacturing') and focuses on the co-existence of copyright and patent laws in the UK and Australia. These jurisdictions share a common origin, notably the Statute of Monopolies[2] for patent law and the Statute of Anne[3] for copyright law. These ancient statutory foundations continue to resonate in Australian IP law. The concept of manufacture from section 6 of the Statute of Monopolies remains the touchstone of patentability in the Patents Act 1990 (Cth)[4] and, in this regard, Australian IP law now mirrors US law more closely than UK law. Like Australia, the US has a broad subject matter requirement of 'machine, manufacture or composition of matter'.[5]

In contrast, the UK's accession to the European Community (subsequently the European Union, or EU) resulted in the adoption of a more European-centric focus in IP laws. The European Commission has engaged in extensive programmes concerning harmonisation of copyright laws (Sterling and Mendis 2015). For example, during the last few years, nine copyright Directives[6] have been implemented. In contrast, patents remain the least harmonized area within the EU (Dunlop 2016). Regardless, the impact of these Directives is that a level of protection similar to that provided in the Directives must be maintained or introduced in EU countries, including the UK.[7]

This chapter, divided into two main parts, considers the co-existence of copyright and patent laws in responding to innovative technologies, using 3D printing as a case study. The reasons for focusing on copyright and patent laws are two-fold. First, since the initial development of 3D printing technologies, 9145 patents related to those technologies have been published worldwide (from 1980–2013) (UK Intellectual Property Office 2013), indicating a high level of patent activity in this field. Second, it is clear that a 3D-printed object can only become a reality if it is

based on a good design file (Lipson and Kurman 2013: 12), and it is this specific element that separates 3D printing from traditional manufacturing. The presence of a 'creative' dimension in the process of 3D design and 3D modelling leading to 3D printing requires a consideration of its status and protection under both copyright and patent laws (Guarda 2013).

1.1 Three-Dimensional Printing: A Definition

Three-dimensional printing is a process whereby electronic data provides the blueprint for a machine to create an object by 'printing' layer by layer. The term '3D printing' 'is a term used to describe a range of digital manufacturing technologies' (Reeves and Mendis 2015: 1). The electronic data source for this design is usually an object design file, most commonly a computer-aided design (CAD) file. The electronic design encoded in the CAD file can be created de novo or derived from an existing physical object using scanning technology (Reeves, Tuck and Hague 2011). CAD files have been described as being the equivalent of the architectural blueprint for a building, or the sewing pattern for a dress (Santoso, Horne and Wicker 2013). The CAD file must be converted into another file format before the design can be 3D-printed, with the industry standard file format being stereolithography (STL) (Lipson and Kurman 2013: 79).

Each component of the 3D printing and scanning landscape is likely to have some form of IP associated with it, in the form of patents, copyright, industrial designs, trade marks, trade secrets, or other IP rights, whether attached to the object being printed, the software, hardware, materials, or other subject matter. The focus in this chapter will be on the physical objects being printed and their digital representations in CAD files.

2. Subsistence, Enforcement, and Infringement of Copyright Laws for 3D Printing: A View from the UK and Australia

A 3D printer without an attached computer and a good design file is as useless as an iPod without music (Lipson and Kurman 2013: 12). With software and CAD files playing such an integral part in the 3D printing process, it is important to provide

a detailed consideration to their eligibility for copyright protection (and for patent protection as discussed in Section 3 of this chapter). In this section, the authors consider the applicability of copyright law to 3D models, CAD files, and software under UK and Australian laws.

2.1 The Application of UK Copyright Law to 3D Printing: Subsistence and Protection

In the UK, section 4(1) of the Copyright, Designs and Patents Act 1988 (as amended) (hereinafter CDPA 1988) states that 'a graphic work, photograph, sculpture or collage, irrespective of artistic quality . . . or a work of artistic craftsmanship' is capable of artistic copyright protection. Section 4(2) defines a 'sculpture' as a 'cast or model made for purposes of sculpture'.

According to the above definition, it can be deduced that a *3D model or product*, which comes into being from a CAD-based file, can be considered an artistic work (CDPA 1988 s 17(4)). A number of legal decisions in the UK have attempted to clarify this position, particularly the meaning of 'sculpture',[8] including 3D works such as models. In *Lucasfilm*,[9] the Supreme Court, agreeing with the Court of Appeal's decision, held in favour of the defendant, claiming that the *Star Wars* white helmets were 'utilitarian' as opposed to being a work of sculpture, and therefore not capable of attracting copyright protection.[10] This case indicates that copyright protection for a sculpture (or work of artistic craftsmanship), which is industrially manufactured, is limited to objects created principally for their artistic merit, that is, the fine arts. Elements such as 'special training, skill and knowledge' that are essential for designing 3D models—whether utilitarian or artistic, such as the *Star Wars* white helmets—were deemed to be outside the scope of this section. Therefore, unless the sculpture or 3D model encompasses an original image or an engraving, for example, it will not attract copyright. This can be viewed as a significant limitation of UK copyright law in relation to the protection of industrially produced 3D models. Section 51 of the CDPA 1988, on which this decision was based, states that

> it is not an infringement of any copyright in a design document or model recording or embodying a design for anything other than an artistic work or a typeface to make an article to the design or to copy an article made to the design.

To clarify, it is not copyright in the design itself, but copyright in the design document or model, which is affected by this section.[11] Furthermore, section 52(2) of the CDPA limits copyright protection for these types of artistic works to 25 years, where more than 50 copies have been made, which favoured the defendant in *Lucasfilm*.[12]

A change to UK copyright law will mean that *Lucasfilm* will have little effect in the future.[13] A repeal of section 52 of CDPA 1988, which came into force on 28 July 2016, will provide more protection for designers of 3D objects by offering the same term of protection as other artistic works (life of the creator plus seventy years).[14] In determining 'artistic craftsmanship' under the repealed section 52, consideration of 'special training, skill and knowledge in production' will be taken into account as well as the quality (aesthetic merit) *and* craftsmanship of the artistic work (UK Intellectual Property Office 2016: 7). This brings the UK closer to the Australian position, although as discussed below, a higher level of protection is afforded to a designer in Australia under section 10(1) of the Australian Copyright Act 1968.

Moving on from a physical 3D model to the applicability of copyright law to CAD design files supporting the model, section 3(1) of the CDPA 1988 and the EU Software Directive[15] offers some guidance. According to section 3(1), a computer program and its embedded data are together recognized as a literary work under copyright law[16] and, according to Recital 7 of the Software Directive, a 'computer program' is considered to 'include programs in any form including those which are incorporated into hardware'. It also 'includes preparatory design work leading to the development of a computer program provided that the nature of the preparatory work is such that a computer program can result from it at a later stage'. An analysis of Recital 7 of the Software Directive ascertains that 'the protection is . . . bound to the program code and to the functions that enable the computer to perform its task. This in turn implies that there is no protection for elements without such functions (i.e. graphical user interface (GUI), or "mere data") and which are not reflected in the code (i.e. functionality in itself is not protected, since there could be a different code that may be able to produce the same function).'[17] In other words, copyright protection will attach to the expression of the computer code and will not extend to the functionality of the software.

From the UK perspective, and in applying section 3(1) of CDPA 1988 ('computer program and its embedded data are together recognised as a literary work') to 3D printing, it can be argued that a computer program encompasses a design file or CAD file within its definition and is therefore capable of copyright protection as a literary work. Some support for this view can be found in *Autospin (Oil Seals) Ltd. v Beehive Spinning*,[18] where Laddie J makes reference, in obiter dictum, to 3D articles being designed by computers and states that 'a literary work consisting of computer code represents the three dimensional article'.[19] Similarly, in *Nova v Mazooma Games Ltd*, Jacob LJ, referring to the Software Directive implemented by the CDPA 1988, confirmed that for the purposes of copyright, the program and its preparatory material are considered to be one component, as opposed to two.[20] However, as discussed in the Australian context, this is an intractable question that requires clarification, which could come about in the form of a case in the future.

2.2 The Application of Australian Copyright Law to 3D Printing: Subsistence and Protection

In Australia, the definition of 'artistic work' in section 10(1) of the Copyright Act 1968 (Cth) (Copyright Act) includes:

(a) a painting, sculpture, drawing, engraving or photograph, whether the work is of artistic quality or not;

(b) a building or a model of a building, whether the building or model is of artistic quality or not; or

(c) a work of artistic craftsmanship whether or not mentioned in paragraph (a) or (b); . . .

Original 3D-printed objects would seem to fall within the definition of artistic works and accordingly, qualify for copyright protection. If they are classified as sculptures or engravings, paragraph (a) of the definition specifies that their artistic quality is irrelevant.[21] If they are models of buildings, likewise paragraph (b) removes the requirement for artistic quality. This is a significant departure from the position in the UK. Should a case similar to *Lucasfilm* be brought in Australia, it is possible that the *Star Wars* helmet would be considered a sculpture, even though it is primarily utilitarian. Accordingly, even though 3D-printed products are within the realm of functional products, if they incorporate some artistic component, such as an original image, engraving, or distinctive shape, they would qualify as artistic works in Australia.[22]

Interestingly, according to section 10(1)(c) of the Copyright Act, works of artistic craftsmanship (as opposed to works falling under paragraphs (a) or (b)) require a level of artistic quality. Although there is no requirement for them to be 'handmade', they must demonstrate originality and craftsmanship unconstrained by functional considerations.[23] In other words, creativity becomes paramount when considering works of this type, and objects that are primarily utilitarian in nature would fail to qualify.

This lack of attention to artistic quality for all but works of artistic craftsmanship in Australia differs from the position in the UK (and the US) (Weinberg, 2013: 14–19; Rideout 2011: 168), where a clear distinction is drawn between creative and functional works. Notably, however, there is an important qualification in Australian law that makes this difference less significant in practical terms. The Copyright Act precludes actions for infringement of copyright in artistic works (other than buildings or models of buildings, or works of artistic craftsmanship) that have been applied industrially,[24] or in respect of which a corresponding industrial design has been registered under the Designs Act 2003 (Cth).[25] An artistic work will be taken to have been applied industrially if applied:

(a) to more than 50 articles; or

(b) to one or more articles (other than hand-made articles) manufactured in lengths or pieces.[26]

This exception leaves a gap in IP protection for objects falling within s 10(1)(a) of the Copyright Act that have been industrially applied, but in respect of which industrial design protection has not been sought. This gap in protection is similar to that arising in the UK as a result of the *Lucasfilm* case, albeit through a different route. This failure to protect a functional item is not inconsistent with the central tenet of copyright law, but the potential for both Australian and UK copyright law to fail to protect creative objects that are also functional is exaggerated in the 3D-printing scenario where the distinction between creative and functional is not always clearly demarcated.

In relation to the computer files behind 3D printing, the Australian legal position is again different. The starting point for copyright protection of software is section 10(1) of the Copyright Act (as amended), which includes computer programs within the definition of literary works. Computer programs are further defined as a 'set of instructions designed to bring about a particular result'.[27] The current definition is a result of a number of revisions and legal decisions. For example, the 1984 definition of computer programs referred to the requirement for the program to 'perform a particular function'.[28] The majority in the High Court case of *Data Access Corp*[29] acknowledged that, while there were difficulties in accommodating computer technology in copyright law, the Act expressly required them to do so.[30] Emmett J in *Australian Video Retailers Association Ltd* confirmed that the 'underlying concept' of the earlier definition was retained in the new definition.[31] As such, it would appear that the functionality requirement remains a key feature of computer program copyright in Australia—which distinguishes it from EU and UK copyright jurisprudence.

As for the copyright status of CAD files themselves, this is a more intractable question. CAD files certainly resemble software in that they provide the necessary instructions (or a blueprint) (Lipson and Kurman 2013: 12) to a printer as to how to print a particular object. However, it can be argued that rather than software, they are data files (Rideout 2011), more in the nature of computer-generated works (Andrews 2011),[32] which have been held under Australian law to be outside the scope of works of authorship.[33]

As in the UK, the underlying electronic design included in a CAD file could constitute an artistic work under Australian law. There is no doubt a CAD file may digitally represent an (as yet unprinted) original article, and that significant creative thought might go into the design of the object. As such, considering the law in Australia, it can be concluded that the electronic design underpinning a CAD file could constitute an artistic work in the form of a drawing, which 'includes a diagram, map, chart or plan.'[34] This is the case, even though the CAD file is electronically generated.

2.3 Enforcement and Infringement: The Capacity of UK Copyright Law to Protect

The preceding sections considered whether copyright could subsist in different elements of the 3D printing process, in both UK and Australian law. This section, and

the one that follows, considers how enforceable these rights are in each jurisdiction. Section 2.1 above concluded that UK copyright could subsist in 3D-printed designs created for 3D printing as artistic works, while protection as literary works remains open for debate. However, the ability to share the design file with ease for purposes of 3D printing means that this technology generally lends itself to infringement more easily. As replication becomes easier, IP rights will become increasingly difficult to enforce.[35] The fact that 3D-printed products are ~~produced~~ digitally makes it easier to produce copies and harder to detect infringement.[36] The lack of control for IP rights holders brought about by 3D printing (Hornick 2015: 804–806) and the ease with which digital files may be transferred compound this problem.

Online platforms dedicated to the dissemination and sharing of 3D designs provide online tools (Reeves and Mendis 2015: 40)[37] that facilitate creation, editing, uploading, downloading, remixing, and sharing of 3D designs. This allows users to modify shared CAD files. This in turn raises questions as to whether modified CAD designs infringe the original design or attract new copyright, and whether online platforms could be liable for authorizing infringement. These issues are considered in turn.

In considering original CAD designs, guidance on 'originality' in the UK has been established through a line of cases ranging from *Graves' Case*[38] to *Interlego*[39] to *Sawkins*,[40] among others.[41] In *Interlego*, the Court concluded that the plaintiff's engineering drawings of its interlocking toy bricks, re-drawn from earlier design drawings with a number of minor alterations, did not qualify for copyright protection (Ong 2010: 172).[42] Lord Oliver further clarified the English courts' approach to skill, labour, effort, and judgement by pointing out that 'skill, labour or judgement merely in the process of copying cannot confer originality'.[43] It was established by the Court that if there is to be 'modification' there has to be

> some element of material alteration or embellishment which suffices to make the totality of the work an original work (. . .) but copying, *per se*, however much skill or labour may be devoted to the process, cannot make an original work.[44]

A reading of Lord Oliver's dictum implies that it is the *extent* of the change, in particular a 'material' change, which will qualify the work as an original work thereby attracting a new copyright (Ong 2010: 165–199).[45]

An application of these cases raises the question of whether a 3D model, which is created from a scan and transformed through the use of online tools, can attract new copyright where the scanning (angle, lighting, positioning) and 'cleaning up' of the scanned data requires skill, labour, effort and judgement. Some guidance for answering this question can be drawn from the above-mentioned cases as well as from *Antiquesportfolio.com*,[46] *Johnstone*,[47] *and Wham-O Manufacturing*,[48] which suggest that if a 'substantial part' is taken from another creator in designing a 3D model, then it can lead to an infringing work. Therefore, it is quite clear that where a work is 'copied' without authorization, it will constitute copyright infringement.

On the other hand, the application of the European 'authorial input' jurisprudence, as seen in cases such as *Infopaq*,[49] requires the personal touch of the creator (rather than being an exact replica) before it can attract new copyright. As such, it could be argued that making creative choices, such as selecting particular views of the physical object when a 3D digital model is created through scanning an object, is sufficient to make the 3D digital model an 'intellectual creation of the author reflecting his personality and expressing his free and creative choice' (Mendis 2014)[50] in its production.

On the second point of authorising infringement, it can be argued that online platforms that authorise or facilitate infringement, can be held liable for secondary or indirect infringement (Daly 2007).[51] Such activity is prohibited in the UK by section 16(2) of CDPA 1988.[52] Online file-sharing services such as Pirate Bay, among others, which have authorized the sharing of content in the knowledge that they are infringing articles, have been held liable for secondary infringement (Quick 2012).[53] In taking this view, the Courts established that the facilitators had knowledge of the infringing activity taking place.[54] It is suggested that 3D printing opens up a new type of content sharing, while at the same time raising similar problems as have already been seen in issues relating to Games Workshop (Thompson 2012: 1–2) and Pokémon,[55] among others.

2.4 Enforcement and Infringement: The Capacity of Australian Copyright Law to Protect

Under the Australian Copyright Act, trans-dimensional as well as uni-dimensional copying may found a copyright infringement action.[56] For example, producing a 3D copy of a protected CAD file could infringe copyright, as could producing a CAD file from a copyright-protected item, for example, by scanning the product. Although reproducing in another medium (for example, by making an artistic work from a written description protected by literary work copyright) will not infringe,[57] an action in infringement for indirect copying of an artistic (or other) work may arise through use of a verbal or written description of the work.[58] The question here is whether this description 'conveys the form (shape or pattern) of those parts of the design which are the copyright material alleged to have been "copied" or whether the description conveys only the basic idea of the drawing or artefact.'[59] It is not inconceivable that this might include a CAD file, which contains a detailed digital version of a product.

In establishing infringement for scanning protected works, evidence of derivation from the protected work is required, as well as objective similarity between works.[60] Provided sufficient similarity can be objectively established between an original and an allegedly infringing work, some degree of modification is to be expected,[61] for

example by using online tools to modify a file. As under UK law, use of a 'substantial part' of a protected work will be sufficient to establish infringement.[62] It is quite possible that copyright in a new work might arise during the course of infringement if the new work is sufficiently original. But even so, under current Australian law the creator will still be liable for infringement of the original work.[63]

As a further point, to date the Australian Government has refused to entertain the notion of a fair use exception under Australian copyright law, despite this being a firm recommendation of the Australian Law Reform Commission (Australian Law Reform Commission 2014: chs 4 and 5). An exception of this nature would incorporate the concept of transformative use in asking whether a particular use is different to the purpose for which the copyright work was created (Australian Law Reform Commission 2014). This matter is once again receiving further consideration at a reform level (Productivity Commission 2016). Should changes be made to Australia's very limited fair dealing exception to copyright law,[64] the implications for IP holders in the context of copying through 3D printing could be significant. This is because a fair use defence could protect those scanning and modifying files from infringement, but only to the extent that the intended use is transformative.

As for indirect copyright infringement in the context of 3D printing, sections 36(1A) and 101(1A) of the Copyright Act provide that a person can be liable for authorizing direct infringement committed by another party. The complexity of these provisions is mirrored in the density of interpretive case law, which is impossible to analyse comprehensively in this chapter. In determining whether a person has authorized infringement, the following (non-exhaustive) factors must be taken into account by the court:

(a) the extent (if any) of the person's power to prevent the doing of the act concerned;

(b) the nature of any relationship existing between the person and the person who did the act concerned;

(c) whether the person took any reasonable steps to prevent or avoid the doing of the act, including whether the person complied with any relevant industry codes of practice.

These factors have been interpreted by the High Court of Australia as requiring a court to ask whether an alleged infringer 'sanctioned, approved or countenanced' infringement by a third party.[65] However, these 'Moorhouse requirements' have subsequently been given a relatively narrow reading: the relevant question now is whether the authoriser had any direct power to prevent infringement.[66] The onerous nature of the task of exercising the power is a critical factor (Lindsay 2012; McPherson 2013). For example, an Internet Service Provider (ISP) would be unlikely to be liable for authorization where the only direct power it has to prevent infringement is to terminate the contractual services it provides,[67] particularly

where identifying infringers would be a difficult and time-intensive inquiry.[68] Although not yet tested in the 3D printing context, the implications of this narrow reading are significant: proprietors of file-sharing websites such as Thingiverse and Shapeways are unlikely to be in a position to identify and prevent uploading of potentially infringing CAD files, or subsequently found liable for authorizing infringement under Australian copyright law.

3. Subsistence, Enforcement, and Infringement of Patent Laws in the 3D Printing Context: A View from the UK and Australia

Having considered the challenges for copyright law from the perspective of the UK and Australia, the chapter now considers the implications for patent law. The issues inherent in copyright law in traversing the informational/physical divide become even more pronounced in patent law as its realm has expanded to incorporate subject matter characterized not by physicality, but by intangibility that results in some tangible effect. This has distinct implications for 3D printing products and processes, manifesting primarily in exclusions from patent eligibility.

3.1 Patent Subsistence

A patent is a monopoly right over an invention, which gives the inventor or owner the exclusive right to exploit that invention in return for fully disclosing it to the public. For patent eligibility, the first hurdle is whether there is patentable subject matter, which recently has been the focus of judicial attention in many jurisdictions, particularly in the context of computer-implemented and biological subject matter (Feros 2010). In the distant past, there was reluctance to accept computer programs as patentable subject matter because they were regarded as merely reciting mathematical algorithms (Christie and Syme 1998). Similarly, products from the natural world were regarded as unpatentable discoveries. Over time, it became widely accepted that, if a computer program is applied to some defined purpose, which has some tangible effect, this may be enough for it to be patentable.[69] Likewise, if a product taken from the natural world has some artificiality, or some material advantage

over its naturally occurring counterpart, it, too, could be patentable.[70] These issues are explored below in the context of UK and Australian patent law.

3.2 The Application of UK Patent Law to 3D Printing: Subsistence and Protection

Under UK law, the requirements for patentability are contained in section 1 of the Patents Act 1977, which specifies that an invention is patentable if it is new, involves an inventive step, and is capable of industrial application.[71] On the face of it, there is scope for many 3D-printing products and processes to meet these patent criteria. However, section 1 goes on to list a number of specific exclusions from patent eligibility, some of which appear to be directly applicable to 3D-printing technology.[72] The exclusion of computer programs is of particular relevance here.[73] Section 4A provides additional exclusions relating to methods of medical treatment and diagnosis. Relevantly, these exclusions translate from the European Patent Convention ('EPC').[74] The scope of the exclusions in section 1 is limited, only extending to 'that thing as such'. Although 'technical' subject matter may thus be patentable, what falls within this purview has been subject to diverging interpretations (Feros 2010). In early decisions, the European Patent Office (EPO) and the UK courts employed a 'technical contribution' approach, as illustrated in *Vicom*[75] and *Merrill Lynch*,[76] where it was held that some technical advance on the prior art in the form of a new result needed to be identified.

Recent EPO cases have demonstrated a shift in approach to excluded matter, with a broader 'any hardware' approach now being the EPO's test of choice.[77] In the UK, by contrast, *Aerotel*[78] now provides a comprehensive four-stage test for determining whether subject matter that relates to the section 1 exclusions is patentable: 1) properly construes the claim for patentability; 2) identifies the actual contribution; 3) asks whether it falls solely within the excluded subject matter; and 4) checks whether the actual or alleged contribution is actually technical in nature. This approach is deemed equivalent to the prior UK case law test of 'technical contribution',[79] but not necessarily the EPO 'any hardware' approach (Feros 2010). It was confirmed in *Symbian*[80] that exclusion from patent eligibility will not automatically occur merely on the ground that the use of a computer program was involved;[81] technical contribution and improved functionality are key.[82]

Functional aspects of 3D printing software will thus be patent eligible following the *Aerotel* approach.[83] This would incorporate design-based software associated with 3D printing, provided it meets all of the criteria listed in *Aerotel*. However, the patentability of CAD files themselves is more questionable. Because they are purely informational, it seems unlikely that the courts would consider them to fulfil any sort of technicality requirement. Tangible inputs into and outputs from 3D printing are another matter. Their physical form and technicality would qualify them for

patent protection, provided they meet the other patent criteria of novelty, inventiveness, and industrial application.[84] Some functionality must be demonstrated, so that purely artistic 3D-printed works will not be eligible for protection under UK law.

3.3 The Application of Australian Patent Law to 3D Printing: Subsistence and Protection

Although Australian patent law includes the same basic criteria of subject matter, novelty, inventiveness, and industrial applicability as UK patent law, there are some significant differences in the ways in which these criteria are applied. Most relevantly, unlike the UK, there is no express list of subject matter that is considered to be patent ineligible. Rather, section 18 of the Patents Act 1990 simply requires that there is a 'manner of manufacture within the meaning of section 6 of the Statute of Monopolies'. Section 18 of the Act also includes the other patent criteria.[85] The seminal decision of the Australian High Court in 1959 in *National Research and Development Corporation (NRDC)*[86] provides the definitive interpretation of the manner of manufacture test. The Court held that the test is not susceptible to precise formulation, but rather the relevant question is: '[i]s this a proper subject of letters patent according to the principles which have been developed for the application of section 6 of the Statute of Monopolies?'[87] In the particular circumstances of the case, the court held that the requirement was satisfied because the subject matter in issue was an artificially created state of affairs that had economic utility.[88] This two-limbed application of the manner of manufacture requirement became the standard test for patentable subject matter in subsequent cases, including those involving computer-implemented inventions.[89]

Much like in the US,[90] the Australian subject matter requirement was applied favourably to computer-implemented subject matter in early jurisprudence.[91] However, three decisions of the Full Court of the Federal Court of Australia in *Grant*,[92] Research Affiliates[93] and RPL Central[94] emphasized that there must be some physically observable effect to satisfy the requirement for an artificially created state of affairs, and that ingenuity must lie in the way in which the computer is utilized. Attachment to the physical, rather than the informational, world was also a key feature of the recent decision of the High Court of Australia in *D'Arcy*,[95] which related to a nucleotide sequence coding for a protein linked with hereditary breast cancer. The Australian Productivity Commission has since questioned whether software and business methods should be considered to be patentable subject matter.[96]

As a consequence of these judicial decisions, it seems clear that CAD files would fail at the manner of manufacture hurdle because they are, in essence, information. It has been argued that consideration be given to expanding the scope of patentable subject matter to make protection available for CAD files (Brean 2015). The authors

suggest, however, there is little hope of success, primarily because CAD files simply lack the core features of patentable subject matter. In contrast to the situation with regard to CAD files, 3D objects that form the inputs into and outputs from 3D printing are less likely to fall foul of the manner of manufacture requirement, because they have the necessary physicality. However, as with the UK, they would still need to satisfy the other patent criteria.

3.4 Enforcement and Infringement: The Capacity of UK Patent Law to Protect

As in Part 2, the following two sections reflect on how enforceable both UK and Australian patent laws are in relation to those aspects of 3D printing to which patent protection attaches in each jurisdiction. Under UK law, acts of direct patent infringement include making the invention, disposing or offering to dispose of or using the invention, importing the invention, and keeping the invention.[97] It is clear that 3D printing a replica of a product that contains all the essential elements of an invention would fall within the statutory definition of 'make', but simply creating a CAD file of a patented item would not. 3D printing permits a significant degree of modification or 'repair' to occur by scanning an object and making changes within a CAD file. The act of 'repair' falls outside the scope of direct patent infringement. And yet it will not always be clear in the 3D printing context when something has been 'repaired', as opposed to 'made'.[98]

The House of Lords considered the concepts of 'repair' and 'making' in *United Wire*,[99] holding that the right to repair is the residual right and that the disassembly of a product is in effect a new infringing manufacture. In *Schutz*,[100] the Supreme Court confirmed that the meaning of 'makes' is context specific, must be given its ordinary meaning, and requires a careful weighing of factors.[101] It is relevant to ask whether the produced item is 'such a subsidiary part of the patented article that its replacement (. . .) does not involve "making" a new article.'[102]

The corollary is that the 3D printing of a spare part of an object would not amount to infringement once the spare part is deemed a subsidiary component. On the other hand, it would be likely to constitute patent infringement if the 3D-printed part is regarded as a 'core' component of a product (Birss 2016). Relevant questions to determine whether a part is core or subsidiary are: whether a 3D-printed part is a free-standing replaceable component; whether a particular part needs frequent substitution; whether it is the main component of the whole; whether the replacement involves more than mere routine work; and whether the market prices are significantly different after utilising the replacement.[103]

Importantly however, facilitating infringement by distributing a CAD file has the potential to fall within the scope of indirect infringement under UK law. Indirect or contributory patent infringement occurs where an infringer

supplies or offers to supply in the United Kingdom a person (. . .) with any of the means relating to an essential element of the invention. . .that those means are suitable for putting, and are intended to put, the invention into effect.[104]

The requisite 'means' have traditionally been required to be tangible in nature, so that simple and abstract instructions would not qualify (Mimler 2013). However, in *Menashe Business Mercantile*,[105] it was held that the infringer's host computer was 'used' in the UK regardless of the fact that it was physically located abroad in the Caribbean. The supply in the UK of software on CDs or via Internet download enabled customers to access the host computer, and the entire online gaming system was deemed contributory infringement. This was the case regardless of the geographical location of the alleged infringing computer system, provided that clients were given a means to access the system.

Online platforms that provide means of access to infringing CAD files would potentially be liable for contributory infringement, as would private or commercial entities that scan objects, and create and distribute CAD files representing those objects (Ballardini, Norrgard, and Minssen 2015). The important point here is the fact that, in these instances, access to infringing CAD files has been facilitated. The provision of means to infringe is key to establishing liability.

3.5 Enforcement and Infringement: The Capacity of Australian Patent Law to Protect

Section 13 of the Patents Act 1990 confers upon a patentee the exclusive right to exploit, and to authorize others to exploit an invention. 'Exploit' in relation to an invention includes making, hiring, selling or otherwise disposing of an invention (or offering to do any of these acts), using, or importing it. A similar definition applies in respect of products arising from method or process inventions.[106]

Primary infringement is likely to be found where a product that contains all the integers of an invention is 3D printed. For example, printing a replica that contained all the integers of an invention[107] would constitute 'making' the invention. Further, the Australian Federal Court decision in *Bedford Industries* establishes a broad definition of 'use' that appears to encompass taking commercial advantage of a patented product by making an infringing product, and altering it before sale to produce a non-infringing product.[108] Creating and distributing a CAD file of an invention, whether by scanning or designing it from scratch, is a separate issue. Creating a CAD file does not reproduce all the integers of an invention in tangible form and so does not constitute 'making' an invention. Likewise, creating a CAD file could not equate to 'using' an invention in line with the use contemplated in the *Bedford Industries* case: even if a CAD file was created and the product 'tweaked', there is no intermediate 'making' of a tangible product. The product is 'made' later when printing occurs. Thus, a finding

of primary infringement for CAD file creation is extremely unlikely (Liddicoat, Nielsen, and Nicol 2016).

But the Patents Act 1990 also provides a patentee with the capacity to sue for secondary infringement. Authorizing another to infringe a patent is a form of secondary infringement,[109] as is supply of a product for an infringing use.[110] To take authorization infringement first, the Patents Act 1990 contains no guidelines as to what criteria can be taken into account in determining whether infringement has been authorized, although the term has been held to have the same meaning as the corresponding provision in the Copyright Act 1968.[111] Accordingly, the Copyright Act guidelines are also relevant in this context.[112]

In contrast with the position under copyright law, however, a broad reading of the *Moorhouse* requirements (discussed in Section 2.5) continues to be applied in patent law. Creating a file that embodies an infringing product and uploading it to a file-sharing website would put the creator at risk of infringement by authorization, should the file be downloaded and printed. Liability could simply be avoided by choosing not to create the file. This is the case even on a narrow reading of the *Moorhouse* requirements. A broad reading would also conceivably lead to a finding of infringement on the part of the ISP, provided they have the resources and power to identify and remove infringing files.

Finally, supply infringement under the Patents Act 1990 provides that supply of a product for an infringing use may constitute infringement,[113] provided certain conditions are met.[114] It is not clear whether a CAD file would fit the definition of 'product', although given that it can be an item of commerce,[115] there seems to be a strong argument that it does. It appears that it will be sufficient if it can be objectively assessed that the use for which the product was supplied was an infringing one.[116] Hence, evidence that a CAD file embodying an infringing product was created and distributed by some means will be strong evidence that the CAD file was supplied to facilitate an infringing use. A CAD file has only one reasonable use: as a tool to print the product it represents. In this respect, under Australian law, supply infringement, like authorization infringement, is an effective tool through which distributors of infringing CAD files might be pursued for patent infringement.

4. Conclusion

Since their inception, IP laws have needed to evolve due to changes wrought by emerging technologies. This trend has been apparent in various technologies from the printing press to the photocopy machine, to bit torrent technology in more

recent times (Nwogugu 2006; Thambisetty 2014). In each of these cases, the challenge has been to keep pace with these technologies while striking a fair balance between protecting the effort of the creator and providing exceptions for the user (Story 2012). In this sense, 3D-printing technology is no different. As the market for 3D-printed objects continues to expand and the technology itself continues to develop, existing IP laws will need to be reviewed for their adequacy in balancing the interests of originators and users. Online platforms for sharing design files raise particular concerns in this regard.

This chapter has explored the applicability of copyright and patent laws to 3D printing from the perspective of UK and Australian law. In doing so, it has highlighted certain differences between the two jurisdictions while also identifying gaps in the law. The authors considered the subsistence of artistic copyright in relation to CAD files embodying a 3D model and, in this respect, identified section 17(4) CDPA 1988 as the basis for protecting 3D models or products in UK law. However, cases such as *Lucasfilm* have challenged this position, indicating that copyright protection for a sculpture (or work of artistic craftsmanship), which is industrially manufactured (that is, utilitarian), is limited to objects created principally for their artistic merit.

Australian law takes an opposing view, at least on the face on it. According to section 10(1) of the Copyright Act 1968, artistic works other than works of artistic craftsmanship are protected irrespective of their artistic quality. In other words, in Australian law, the *Star Wars* helmet would be a copyright-protected sculpture, even though it is primarily utilitarian. Interestingly, though, the Australian Copyright Act precludes actions for infringement of copyright in artistic works (other than buildings or models of buildings, or works of artistic craftsmanship) that have been applied industrially, or in respect of which a corresponding industrial design has been registered under the Designs Act 2003. As a result, there is a similar gap in protection in both the UK and Australia, albeit through different routes. The UK's repeal of section 52 of CDPA 1988 will spell good news for 3D designers and modellers in that jurisdiction. Yet the failure to protect creative objects that are also functional in both jurisdictions needs to be addressed, particularly in the 3D-printing scenario, where the distinction between the creative and the functional is not always clearly demarcated.

The copyright protection of CAD files themselves is a more intractable question and has been debated by a number of academics. It is clear that legal development is required in this area and this has been recognized by the UK Intellectual Property Office following its 2015 Commissioned Study. A striking feature between the jurisdictions is that, in Australia, the functionality requirement remains a key feature of computer program copyright, departing significantly from EU and UK copyright jurisprudence.

In the patent law context, the authors suggest that CAD files simply lack the core features of patentable subject matter under UK and Australian patent law, although

3D objects may be patentable provided that they fulfil the standard patent criteria. In both jurisdictions, information is not patentable *per se*. There must be some added functionality or technicality. This is the case even though the legal tests for patentable subject matter vary considerably between jurisdictions, with the UK having an express statutory list of excluded subject matter, and Australia leaving this determination to judicial interpretation.

In considering patent infringement, the authors conclude that it would be difficult to establish direct infringement purely by making and distributing a CAD file. In the UK and Australia, there must be physical reproduction of all of the essential integers of the invention as claimed. However, there are possible avenues for recourse under secondary infringement provisions in both jurisdictions. In UK law, liability for indirect infringement may arise for providing the means to infringe, which could include providing access to CAD files without permission of the patent owner. Likewise, liability could arise in Australia for supply infringement. Australian patent law also includes another thread of infringement for authorization of direct infringement by a third party. In sum, although the precise wording of the relevant provisions in Australian and UK patent statutes vary considerably, the outcomes in terms of subsistence and infringement may not be that different, depending, of course, on judicial interpretation.

These conclusions raise some interesting considerations and familiar conundrums. Like many technologies, 3D printing and its associated elements such as online platforms and CAD files, are universal in their reach. Yet the law is territorial. This anomaly reflected through the universality of the technology, coupled together with ever-growing distribution networks may ultimately lead to the law being shaped in different legal regimes, in different ways, resulting in a lack of certainty for creators and users and incompatibility of rights and working conditions across common technological systems.

One option to deal with the unique aspects of 3D-printing technology and the perceived failure of existing IP laws to provide appropriate protection for originators and appropriate rights for users might be to create a sui generis regime of IP protection. Such regimes were created for circuit layouts and plant variety rights,[117] and are at times called for when new technologies present new IP challenges (as in relation to gene sequencing: Palombi 2008). However, in the authors' submission, it would be a rare circumstance when an emergent technology is so disruptive that an entirely new and bespoke response is justified. Rather, even though gaps and inconsistencies have been identified in current laws, nuanced reworking of these regimes is, in the vast majority of circumstances, likely to be a sufficient response.

As we look to the future, creators, users, and legislators should take heart from past experience, which has taught some difficult lessons but also demonstrated adaptability, both from the point of view of the law and technology (Mendis 2013). For example, the chapter outlined the initial reluctance in Australsia to accept computer programs as patentable subject matter because they were regarded as merely

reciting mathematical algorithms (Christie and Syme 1998). However, over time, it became widely accepted that if a computer program is applied to some defined purpose, thereby having some tangible effect, that may be enough for its patentability. In the context of computer-implemented subject matter, the explicit exclusion of 'programs for computers' initially led to the blanket exclusion of all software from patentability under European law. However, the need for global harmonization prompted the EU/UK to shift towards patentability, provided a 'hardware' or a 'technical effect' exists.[118] Copyright law, in general, has broadened its exceptions to incorporate creative works and their use in the digital era, which was not the case a decade ago (Howell 2012).

These examples demonstrate the manner in which the law has evolved to keep pace with emerging technologies, while the convergence of patent and copyright laws, especially in their applicability to computer software, has been increasingly evident (Lai 2016). This is the case in both jurisdictions examined: the interplay between copyright and patent law regimes has permitted adaptability in protection mechanisms and allowed developers to explore the 'best fit' for their particular technology. As 3D printing continues to develop, it is very likely that patent and copyright laws will be strongly challenged but will continue to evolve and co-exist as they have done over the years in response to various technologies.

Notes

1. *Folsom v Marsh*, 9 F. Cas. 342, 344 (C.C.D. Mass. 1841) (no. 4901, Story J).
2. Statute of Monopolies 1624 21 Jac 1, c 3.
3. Statute of Anne 1709 8 Ann c21.
4. Patents Act 1990 (Cth) s 18(1)(a).
5. Patents Act 35 USCS §101.
6. These have included the protection of computer programs, rental/lending rights and related rights, satellite broadcasting and cable retransmission, term of protection, protection of databases, copyright in the information society, artist's resale right, orphan works, and collective rights management, as well as the enforcement Directive, which is of wider application.
7. The future of UK Intellectual Property law within the context of the European Union remains to be seen, following the EU Referendum on 24 June 2016, in which the UK voted to leave the EU. The process of a Member State withdrawing from the EU is set out in Article 50 of the Treaty on European Union (TEU) and must be carried out in line with the UK constitutional tradition. At the time of writing, none of these elements have been triggered, thereby leading to a time of uncertainty for UK law.
8. *Wham-O Manufacturing Co., v Lincoln Industries Ltd* [1985] RPC 127 (NZ Court of Appeal); *Breville Europe Plc v Thorn EMI Domestic Appliances Ltd* [1995] FSR 77; *J & S Davis (Holdings) Ltd, v Wright Health Group Ltd* [1988] RPC 403; *George Hensher Ltd v*

Restawhile Upholstery (Lancs) Ltd [1976] AC 64; *Lucasfilm Ltd & Others v Ainsworth and Another* [2011] 3 WLR 487.

9. *Lucasfilm Ltd & Others v Ainsworth and Another* [2011] 3 WLR 487.
10. *Lucasfilm Ltd & Others v Ainsworth and Another* [2011] 3 WLR 487 [44].
11. 'It was the Star Wars film that was the work of art that Mr. Lucas and his company created . . . the helmet was utilitarian, in the sense that it was an element in the process of production of the film': *Lucasfilm Ltd & others v Ainsworth and another* [2011] 3 WLR 487 [44].
12. CDPA 1988, s 52(2).
13. *Lucasfilm, Hensher (George) Ltd v Restawhile Upholstery (Lancs) Ltd* [1975] RPC 31 (HL) is another case that was considered for the repeal of section 52.
14. See https://www.gov.uk/government/consultations/transitional-arrangements-for-the-repeal-of-section-52-cdpa accessed 4 September 2016.
15. Parliament and Council Directive 2009/24/EC of 23 April 2009 on the legal protection of computer programs [2009] OJ L111/16, recital (7).
16. CDPA 1988, s 3(1)(b), (c) (as amended).
17. Case C-406/10 *SAS Institute Inc, v World Programming Ltd* [2012] 3 CMLR 4. See also Guarda P, 'Looking for a Feasible Form of Software Protection: Copyright or Patent, Is that the Question?' [2013] 35(8) *European Intellectual Property Review* 445, 447.
18. *Autospin (Oil Seals) Ltd v Beehive Spinning* [1995] RPC 683.
19. *Autospin (Oil Seals) Ltd v Beehive Spinning* [1995] RPC 683, 698.
20. [2007] RPC 25.
21. 3D-printed models of buildings would be treated in the same way: Copyright Act 1968 (Cth), s 10(1)(b).
22. *Wildash v Klein* [2004] NTSC 17; (2004) 61 IPR 324.
23. *Burge v Swarbrick* (2007) 232 CLR 336.
24. Copyright Act 1968 (Cth), ss 77(1), 77(2).
25. Copyright Act 1968 (Cth), s 75.
26. Copyright Regulations 1969 (Cth), reg 17(1).
27. This definition was introduced by the Copyright Amendment (Digital Agenda) Act 2000 (Cth).
28. The Copyright Amendment Act 1984 (Cth) introduced this definition: an expression, in any language, code or notation, of a set of instructions (whether with or without related information) intended [for] (a) conversion to another language, code or notation; (b) reproduction in a different material form, to cause a device having digital information processing capabilities to perform a particular function.
29. *Data Access Corp v Powerflex Services Pty Ltd* (1999) 202 CLR 1 [20].
30. *Data Access Corp v Powerflex Services Pty Ltd* (1999) 202 CLR 1 [25].
31. *Australian Video Retailers Association Ltd v Warner Home Video Pty Ltd* (2002) 53 IPR 242 [80].
32. Examples include software, databases, and satellite images generated using automated processes.
33. *IceTV Pty Ltd v Nine Network Pty Ltd* (2009) 239 CLR 458; *Telstra Corporation Ltd v Phone Directories Co Pty Ltd* [2010] 194 FCR 142.
34. Copyright Act 1968 (Cth), s 10(1).
35. See, Mendis D and Secchi D, *A Legal and Empirical Study of 3D Printing Online Platforms and an Analysis of User Behaviour* (UK Intellectual Property Office, 2015) 41. The legal

and empirical study concluded that 'the current landscape of 3D printing online platforms appears to be diverse and many options are presented to users . . . as 3D printing continues to grow, there is evidence of IP infringement, albeit on a small scale at present, on these online platforms. For example, trademarked or copyrighted designs, like an Iron Man helmet or figurines from Star Wars and the videogame Doom or Disney figures are easy to locate. This shows that interest and activity is growing exponentially every year highlighting the potential for future IP issues'.

36. See Bad Vibrations: 'UCI Researchers Find Security Breach in 3-D Printing Process: Machine Sounds Enable Reverse Engineering or Source Code', UCI News (2 March 2016) https://news.uci.edu/research/bad-vibrations-uci-researchers-find-security-breach-in-3-d-printing-process/ accessed 30 May 2016.
37. Amongst others, these include for example, Meshmixer www.meshmixer.com; 123D Catch www.123dapp.com/catch (by Autodesk) Makerbot Customizer; www.thingiverse.com/apps/customizer (by Thingiverse); WorkBench http://grabcad.com/workbench (by Grabcad).
38. *Graves Case* (*1868-69*) LR 4 QB 715.
39. *Interlego AG v Tyco Industries Inc* [1988] RPC 343.
40. *Sawkins v Hyperion Records Ltd* [2005] EWCA Civ 565.
41. *Walter v Lane* [1900] AC 539 (HL); *Antiquesportfolio.com Plc v Rodney Fitch & Co Ltd* [2001] FSR 23 are other examples.
42. *Interlego v Tyco Industries Inc, and Others* [1988] RPC 343.
43. *Interlego v Tyco Industries Inc, and Others* [1988] RPC 343, 371 per Lord Oliver.
44. *Interlego v Tyco Industries Inc, and Others* [1988] RPC 343, 371 per Lord Oliver.
45. It should be noted that the Privy Council's decision in *Interlego v Tyco* was based on a very specific policy concern—that copyright law should not be used as a vehicle to create fresh intellectual property rights over commercial products after the expiry of patent and design rights, which had previously subsisted in the same subject matter. See *Interlego v Tyco Industries Inc, and Others* [1988] RPC 343, 365–366.
46. *Antiquesportfolio.com v Rodney Fitch & Co Ltd* [2001] FSR 345.
47. *Johnstone Safety Ltd v Peter Cook (Int.) Plc* [1990] FSR 16 ('substantial part' cannot be defined by inches or measurement).
48. *Wham-O Manufacturing Co v Lincoln Industries Ltd* [1985] RPC 127 (NZ Court of Appeal).
49. *Infopaq International A/S v Danske Dagblades Forening* [2010] FSR 20.
50. *Painer v Standard Verlags GmbH* [2012] ECDR 6 (ECJ, 3rd Chamber) para 99.
51. The article describes how the facilitators of online platforms actively encouraged infringement by their advertising and benefitted financially from these activities. See Maureen Daly, 'Life after Grokster: Analysis of US and European Approaches to File-sharing' [2007] 29(8) *European Intellectual Property Review* 319, 323–324 in particular.
52. Section 16(2) ('Copyright in a work is infringed by a person who without the licence of the copyright owner does, or authorises another to do, any of the acts restricted by the copyright').
53. *Dramatico Entertainment Ltd & Ors v British Sky Broadcasting Ltd & Ors* [2012] EWHC 268 (Ch).
54. 'Contributory Infringement' was brought against online companies such as Napster. In establishing 'contributory infringement' two elements need to be satisfied: (1) the

infringer knew or had reason to know of the infringing activity; and (2) actively participated in the infringement by inducing it, causing it or contributing to it.

55. 'Pokémon Targets 3D Printed Design, Citing Copyright Infringement' (World Intellectual Property Review, 21 August 2014), available at http://www.worldipreview.com/news/pok-mon-targets-3d-printed-design-citing-copyright-infringement-7067.
56. Copyright Act 1968 (Cth) s 21(3).
57. *Cuisenaire v Reed* [1963] VR 719, 735; applied in *Computer Edge Pty Ltd v Apple Computer Inc* (1968) 161 CLR 171, 186–187 (Gibbs CJ), 206-7 (Brennan J), 212–214 (Deane J).
58. *Plix Products Ltd v Frank M Winstone (Merchants) Ltd* (1984) 3 IPR 390.
59. *Plix Products Ltd v Frank M Winstone (Merchants) Ltd* (1984) 3 IPR 390, 418.
60. *Elwood Clothing Pty Ltd v Cotton On Clothing Pty Ltd* (2008) 172 FCR 580 [41].
61. *EMI Songs Australia Pty Ltd v Larrikin Music Publishing Pty Ltd* (2011) 191 FCR 444.
62. *Elwood Clothing Pty Ltd v Cotton On Clothing Pty Ltd* (2008) 172 FCR 580 [41].
63. *A-One Accessory Imports Pty Ltd v Off-Road Imports Pty Ltd* [1996] FCA 1353.
64. See Copyright Act 1968 (Cth) s 40.
65. *University of New South Wales v Moorhouse* (1975) 133 CLR 1, 20 (Jacobs J with whom McTiernan ACJ agreed).
66. Roadshow Films Pty Ltd v iiNet Ltd *(2012) 248 CLR 42.*
67. Roadshow Films Pty Ltd v iiNet Ltd *(2012) 248 CLR 42, 69–71 (French CJ, Crennan and Kiefel JJ), 88–89 (Gummow and Hayne JJ).*
68. Roadshow Films Pty Ltd v iiNet Ltd *(2012) 248 CLR 42, 68 (French CJ, Crennan and Kiefel JJ), 88–89 (Gummow and Hayne JJ).*
69. See, for example, the seminal US case of *Gottshalk v Benson* 409 US 63 (1972).
70. One of the best examples of this move towards patentability of synthetically produced biological products is another key US case, *Diamond v Chakrabarty* 447 US 303 (1980).
71. Patents Act 1977 (UK) s 1(1).
72. See Patents Act 1977 (UK) s 1(2).
73. Patents Act 1977 (UK) s (1)(2)(c).
74. The Convention on the Grant of European Patents of 5 October 1973 as amended by the act revising Article 63 EPC of 17 December 1991 and by decisions of the Administrative Council of the European Patent Organisation of 21 December 1978, 13 December 1994, 20 October 1995, 5 December 1996, 10 December 1998 and 27 October 2005.
75. *Vicom System Inc's Patent Application* [1987] 2 EPOR 74.
76. *Merrill Lynch* [1989] RPC 561.
77. See *Controlling Pension Benefits System/PBS Partnership* T 0931/95 [2001], *Auction Method/Hitachi T 0258/03* [2004] OJEPO 575; *Clipboard Formats I/Microsoft* T 0424/03 [2006].
78. [2007] RPC 7.
79. UK Intellectual Property Office, *Manual of Patent Practice: Patentable Inventions* (2014) [1.08]; *Aerotel v Telco* [2006] EWCA Civ 1371; *Macrossan's Patent Application* [2006] EWHC 705 (Ch).
80. *Symbian Ltd v Comptroller General of Patents* [2008] EWCA Civ 1066.
81. Currently the EPO follows the 'any hardware' approach in Pension Benefits System where 'the character of a concrete apparatus in the sense of a physical entity' could be demonstrated; *Pension Benefits System* [2001] OJ EPO 441.
82. *Symbian Ltd v Comptroller General of Patents* [2008] EWCA Civ 1066 [53]-[55].

83. *Aerotel v Telco* [2006] EWCA Civ 1371; *Macrossan's Patent Application* [2006] EWHC 705 (Ch).
84. Patents Act 1977 (UK) s 1(1).
85. Patents Act 1990 (Cth) s 18(1).
86. *National Research and Development Corporation v Commissioner of Patents* (1959) 102 CLR 252.
87. *National Research and Development Corporation v Commissioner of Patents* (1959) 102 CLR 252, 269.
88. *National Research and Development Corporation v Commissioner of Patents* (1959) 102 CLR 252, 277.
89. See, for example, *CCOM Pty Ltd v Jiejing Pty Ltd* (1994) 28 IPR 481, 514.
90. *State Street Bank and Trust Company v Signature Financial Group, Inc* 149 F.3d 1368 (Fed. Cir. 1998), but note the later US Supreme Court decisions in *Bilski v Kappos* 130 S Ct 3218 (2010) and *Alice Corporation Pty Ltd v CLS Bank International* 134 S Ct 2347 (2014).
91. *Welcome Real-Time SA v Catuity Inc* (2001) 51 IPR 327.
92. *Grant v Commissioner of Patents* [2006] FCAFC 120.
93. *Research Affiliates LLC v Commissioner of Patents [2014]* FCAFC 1.
94. *Commissioner of Patents v RPL Central* [2015] FCAFC 177. It should be noted that the High Court refused special leave to appeal: *RPL Central Ltd v Commissioner of Patents* [2016] HCASL 84
95. *D'Arcy v Myriad Genetics Inc* [2015] HCA 35.
96. Productivity Commission, *Inquiry into Australia's Intellectual Property Arrangements: Final Report* (2016: Commonwealth of Australia, Canberra).
97. Patents Act 1977 (UK) s 60(1).
98. *United Wire Ltd v Screen Repair Services (Scotland) Ltd* [2001] RPC 24.
99. *United Wire Ltd v Screen Repair Services (Scotland) Ltd* [2001] RPC 24.
100. *Schutz (UK) Ltd v Werit UK Ltd* [2013] UKSC 16, [2013] 2 AII ER 177.
101. *Schutz (UK) Ltd v Werit UK Ltd* [2013] UKSC 16, [2013] 2 AII ER 177 [26]–[29] per Lord Neuberger (with whom Lord Walker, Lady Hale, Lord Mance, and Lord Kerr agreed).
102. Ibid [61].
103. Ibid [44], [74], [75].
104. Patents Act 1977 (UK) s 60(2).
105. *Menashe Business Mercantile Ltd and another v William Hill Organisation Ltd* [2003] 1 AII ER 279, [2003] 1 WLR 1462.
106. Patents Act 1990 (Cth) sch 1 (definition of 'exploit').
107. *Walker v Alemite Corp* (1933) 49 CLR 643, 657–658 (Dixon J); *Bedford Industries Rehabilitation Association Inc v Pinefair Pty Ltd* (1998) 87 FCR 458, 464 (Foster J); 469 (Mansfield J); 479–480 (Goldberg J).
108. *Bedford Industries Rehabilitation Association Inc v Pinefair Pty Ltd* (1998) 40 IPR 438.
109. Patents Act 1990 (Cth) s 13(1).
110. Patents Act 1990 (Cth) s 117.
111. *Rescare Ltd v Anaesthetic Supplies Pty Ltd* (1992) 25 IPR 119, 155 (Gummow J); *Bristol-Myers Squibb Co v FH Faulding & Co Ltd* (2000) 97 FCR 524 [97] (Black CJ and Lehane J); *Inverness Medical Switzerland GmbH v MDS Diagnostics Pty Ltd* (2010) 85 IPR 525, 568–570 (Bennett J); *SNF (Australia) v Ciba Special Chemicals Water Treatments Ltd*

(2011) 92 IPR 46, 115 (Kenny J); *Bristol-Myers Squibb Co v Apotex Pty Ltd* (No 5) (2013) 104 IPR 23 [409] (Yates J); *Streetworx Pty Ltd v Artcraft Urban Group Pty Ltd* [2014] FCA 1366 (18 December 2014) [388]-[396] (Beach J).

112. See most recently *Inverness Medical Switzerland GmbH v MDS Diagnostics Pty Ltd* (2010) 85 IPR 525, 568–570 (Bennett J); *SNF (Australia) v Ciba Special Chemicals Water Treatments Ltd* (2011) 92 IPR 46, 115 (Kenny J); *Streetworx Pty Ltd v Artcraft Urban Group Pty Ltd* [2014] FCA 1366 (18 December 2014) [388]–[396] (Beach J).
113. Patents Act 1990 (Cth) s 117.
114. Patents Act 1990 (Cth) s 117(2). These requirements are:

    (a) if the product is capable of only one reasonable use, having regard to its nature or design—that use; or

    (b) if the product is not a staple commercial product—any use of the product, if the supplier had reason to believe that the person would put it to that use; or

    (c) in any case—the use of the product in accordance with any instructions for the use of the product, or any inducement to use the product, given to the person by the supplier or contained in an advertisement published by or with the authority of the supplier.

115. 'Product' has its ordinary meaning: *Northern Territory v Collins* (2008) 235 CLR 619.
116. Unlike s 117(2)(b), ss 117(2)(a) and (c) do not appear to require a mental element: *Zetco Pty Ltd v Austworld Commodities Pty Ltd* (No 2) [2011] FCA 848 [77].
117. In Australia, for example, see Circuit Layouts Act 1989 (Cth) and Plant Breeder's Rights Act 1994 (Cth).
118. *Aerotel v Telco* [2006] EWCA Civ 1371; *Macrossan's Patent Application* [2006] EWHC 705 (Ch).

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